

INFLUENCE OF PROCESSING CONDITIONS ON THE β -PHASE CONTENT OF PVDF SAMPLES PRODUCED BY TAPE EXTRUSION

R. S. Martins¹, O.S. Carneiro¹, S. Lanceros-Mendez², J. M. Nóbrega¹, H. Carvalho³, J.G. Rocha⁴ and M. P. Silva²

¹ IPC/I3N – Institute for Polymers and Composites, University of Minho, Campus de Azurém, 4800-058 Guimarães, Portugal

² Centro/Departamento de Física, Universidade do Minho, Campus de Gualtar, 4710-058 Braga, Portugal

³ Dept. de Engenharia Têxtil, Universidade do Minho, Campus de Azurém, 4800-058 Guimarães, Portugal

⁴ Dept. Eletrónica. Industrial, Universidade do Minho, 4800-058 Guimarães, Portugal

In the field of piezoelectric materials Poly(vinylidene fluoride) (PVDF) is one of the most employed polymer based materials. Previous works [1] have shown that the β -phase content of PVDF strongly influences its electroactive response. In that phase PVDF shows the highest piezoelectric properties, which is commonly obtained through mechanical stretching of α -phase at a given temperature.

This research team has been working during the last couple of years on the development of industrial scalable technologies, based on the extrusion processing technique, for the production of piezoelectric products. This specific work comprises a study on the effect of tape extrusion processing conditions on the content of PVDF β -phase. For this purpose the extruded samples were uniaxially stretched up to ratios of 6, at 80°C and 120°C, being the β -phase content analysed by FTIR. Subsequently, the samples were corona poled and their piezoelectric coefficient d_{33} was measured.

The results obtained allowed to conclude that the extrusion processing variables, with the exception of the stretching temperature and ratio, do not have a strong influence on the β -phase content and piezoelectric response of PVDF.

References:

[1] Influence of the β -phase content and degree of crystallinity on the piezo- and ferroelectric properties of poly (vinylidene fluoride), J. Gomes, J. Serrado Nunes, V. Sencadas and S. Lanceros-Mendez, Smart Materials and Structures, 19 (6), (2010).